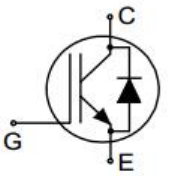
IGBT Features



- 650V,20A
- $V_{CE(sat)(typ.)}$=2.1V@V_{GE}=15V,I_C=20A
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms
- Square RBSOA

General Description

JIAEN trench FS IGBTs offer lower losses, higher energy efficiency and short circuit robustness for application such as motor control, uninterrupted power supplies, inverters and home applications.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Continuous Collector Current (T_C=25℃)	40	A
	Continuous Collector Current (T_C=100℃)	20	A
I_{CM}	Pulsed Collector Current (Note 1)	40	A
I_F	Diode Continuous Forward Current (T_C=100℃)	10	A
I_{FM}	Diode Maximum Forward Current (Note 1)	40	A
t_{sc}	Short Circuit Withstand Time	5	us
P_D	Maximum Power Dissipation (T_C=25℃)	40	W
	Maximum Power Dissipation (T_C=100℃)	15	W
T_J	Operating Junction Temperature Range	-55 to +150	℃
T_{STG}	Storage Temperature Range	-55 to +150	℃

Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th\ j\text{-}c}$	Thermal Resistance, Junction to case for IGBT	3.0	℃/ W
$R_{th\ j\text{-}c}$	Thermal Resistance, Junction to case for Diode	4.2	℃/ W
$R_{th\ j\text{-}a}$	Thermal Resistance, Junction to Ambient	65	℃/ W

Electrical Characteristics (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	V_{GE}= 0V, I_C= 250uA	650	-	-	V
I_{CES}	Collector-Emitter Leakage Current	V_{CE}= 650V, V_{GE}= 0V	-	-	100	uA
I_{GES}	Gate Leakage Current, Forward	V_{GE}=20V, V_{CE}= 0V	-	-	100	nA
	Gate Leakage Current, Reverse	V_{GE}= -20V, V_{CE}= 0V	-	-	-100	nA
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE}= V_{CE}, I_C= 250uA	4.0	-	5.2	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C= 15A	-	1.65	1.95	V
		V_{GE}=15V, I_C= 20A		2.1	2.4	V
Qg	Total Gate Charge	V_{CC}=400V V_{GE}=15V I_C=15A	-	29		nC
Qge	Gate-Emitter Charge		-	6		nC
Qgc	Gate-Collector Charge		-	9		nC
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=400V V_{GE}=15V I_C=15A R_{Gon}=39Ω R_{Goff}=22Ω Inductive Load T_C=25 ℃	-	40	-	ns
t_r	Turn-on Rise Time		-	22	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	98	-	ns
t_f	Turn-off Fall Time		-	107	-	ns
Eon	Turn-on Switching Loss		-	0.24	-	mJ
Eoff	Turn-off Switching Loss		-	0.66	-	mJ
Ets	Total Switching Loss		-	0.9	-	mJ
Cies	Input Capacitance	V_{CE}=25V V_{GE}=0V f = 1MHz	-	886	-	pF
Coes	Output Capacitance		-	52	-	pF
Cres	Reverse Transfer Capacitance		-	15	-	pF

Electrical Characteristics of Diode (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=15A	-	1.4	1.8	V
t_{rr}	Diode Reverse Recovery Time	V_{CE} = 400V I_F= 15A dI_F/dt = 200A/us	-	126		ns
I_{rr}	Diode peak Reverse Recovery Current		-	5.5		A
Q_{rr}	Diode Reverse Recovery Charge		-	296		nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature

Typical Performance Characteristics

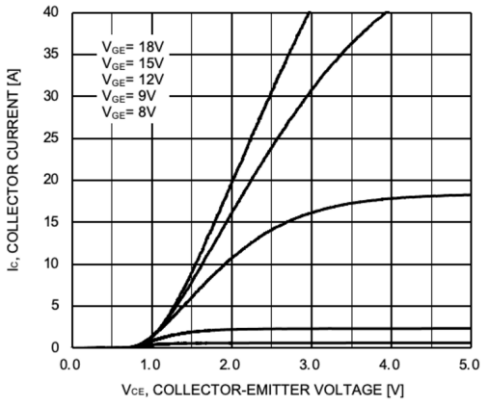


Fig 1. Output characteristics (Tj=25℃)

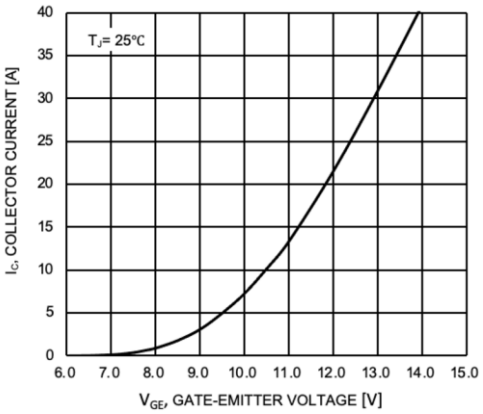


Fig 2. Typical Transfer Characteristics (Tj=25℃)

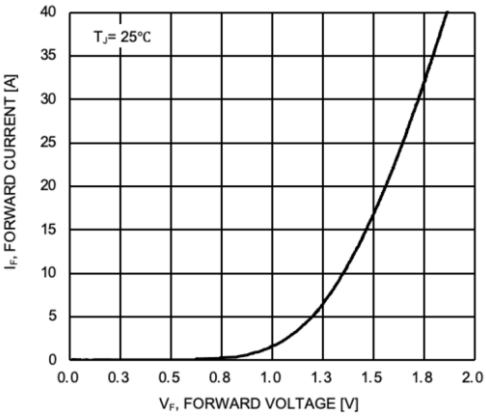


Figure 3.Typical FRD Output characteristics (Tj=25℃)

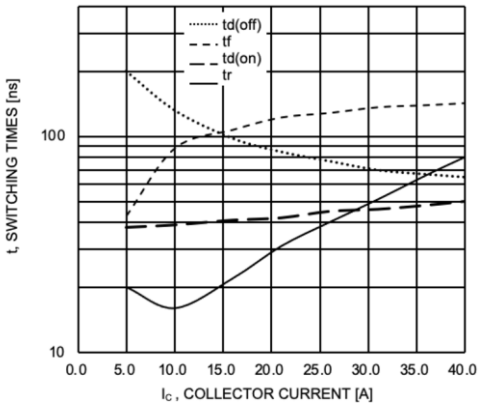


Figure 4. Typical Switching Time vs. Collector Current (Tj=25℃)

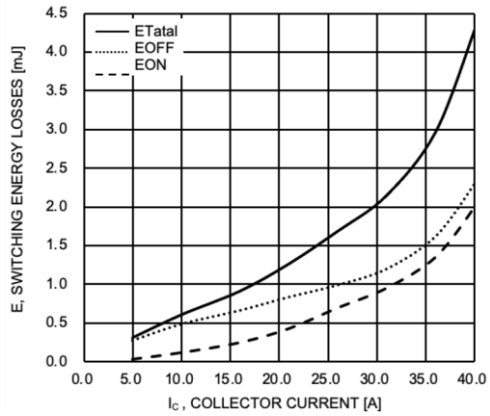


Figure 5. Typical Switching Loss vs. Collector Current (Tj=25℃)

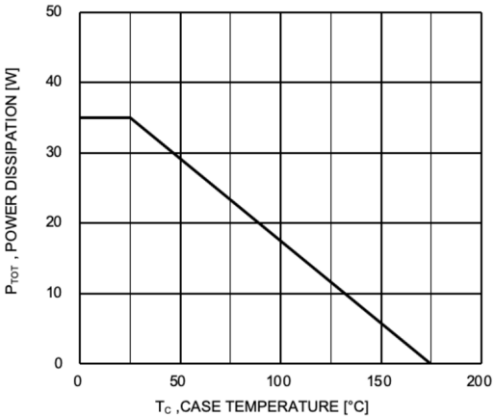


Figure 6. Typical Power Dissipation vs. Case Temperature (TO220F)

Typical Performance Characteristics

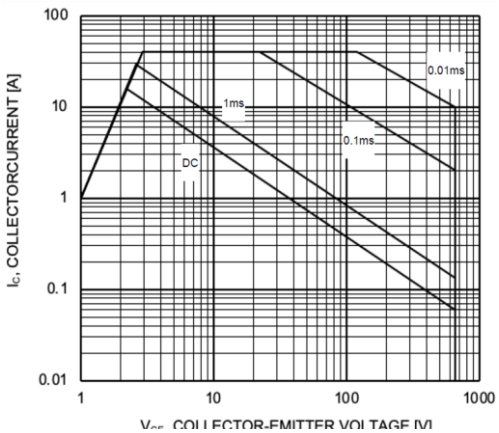
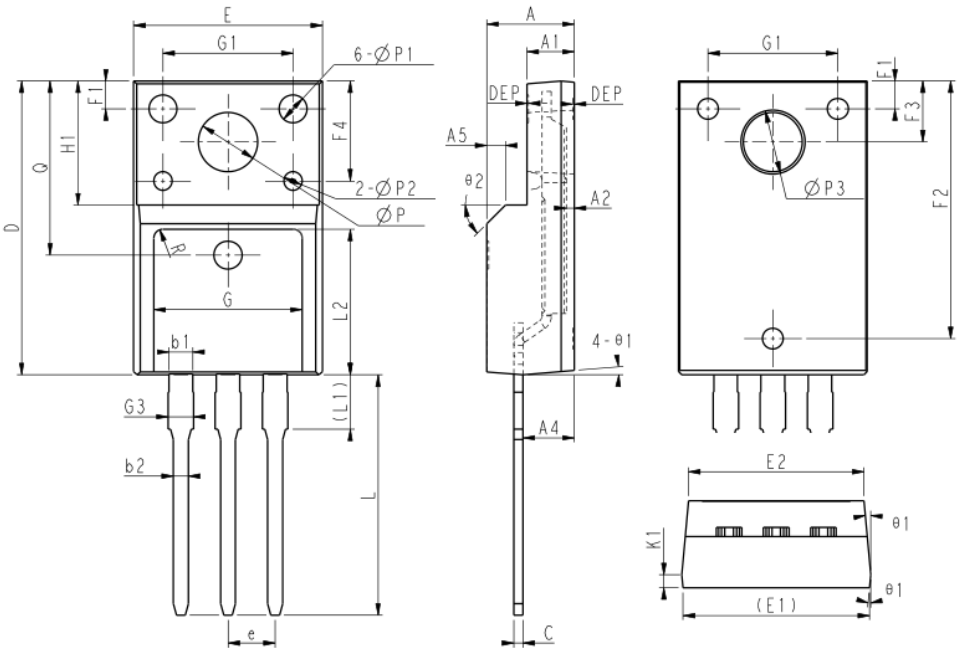


Figure 7. Forward Safe Operation Area vs. Applied Collector Current (TO220F, TJ=25℃)

Package



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
E	10.00	10.16	10.32
E1	9.94	10.04	10.14
E2	9.36	9.46	9.56
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	0.43	–	0.48
A4	2.66	2.76	2.86
A5		1.00REF	
c	0.45	0.50	0.60
D	15.67	15.87	16.07
Q		9.40REF	
H1		6.70REF	
e		2.54BSC	
ΦP		3.18REF	
L	12.78	12.98	13.18
L1	2.83	2.93	3.03
L2	7.70	7.80	7.90
ΦP1	1.40	1.50	1.60
ΦP2	0.95	1.00	1.05
ΦP3		3.45REF	
θ1	3°	5°	7°
θ2	–	45°	–
DEP	0.05	0.10	0.15
F1	1.00	1.50	2.00
F2	13.80	13.90	14.00
F3	3.20	3.30	3.40
F4	5.30	5.40	5.50
G	7.80	8.00	8.20
G1	6.90	7.00	7.10
G3	1.25	1.35	1.45
b1	1.23	1.28	1.38
b2	0.75	0.80	0.90
K1	0.65	0.70	0.75
R		0.50REF	

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